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use of older students who will have their own ways of working, and the very brevity of the laboratory instructions allows greater latitude for both student and teacher. The older courses in invertebrate zoology are being crowded in these days when zoology has developed so much of interest, but some of us have always insisted that it is preposterous for a man to go into zoological work without at least as much knowledge of invertebrate morphology as is set forth in this volume and a man should get this as an undergraduate. Students who have other scientific interests or whose interest in zoology has no direct relation to their subsequent work may well elect, after an introductory study, other courses in preference to this; but for the young zoologist such a knowledge of morphology is a foundation stone, and perhaps our author has produced a volume that will be more lasting because it makes no attempt to modernize the invertebrate course, but offers it on an exclusively morphological basis, leaving the other things to the newer courses in ecology and parasitology and field zoology which are already in our midst.

In behalf of the publishers it may be said that the typographical work is up to their usual standard and the surface and quality of the paper ideal for a work of this nature.

WINTERTON C. CURTIS

CAPTAIN WHITE'S RECENT EXPLORATORY WORK IN AUSTRALIA

FOR several years past I have corresponded regularly with that most indefatigable explorer of certain unknown regions in Australia—Captain S. A. White, of Adelaide. Captain White, who is a member of many scientific societies and institutions, resides upon his elegant estate at Fulham, South Australia, and almost every year, in one capacity or another, he becomes connected with expeditions that explore the entirely unknown regions of the far northwest parts of the Australian continent. On these trips he is accompanied by his wife, who cheerfully shares her husband's trials and dangers, and she is more than entitled to her quota of the glory and credit of their com-

mon discoveries. No fewer than fourteen of these hazardous trips have been made—some of them lasting many months—the travelers pressing their way into the most remote and unexplored districts of this great island continent. Upon the return of the expedition, Captain White usually publishes their discoveries in some of the scientific journals, such as the *Transactions of the Royal Society of South Australia*; but in addition to these accounts he gets out popular ones in booklet form, and he has kindly presented me with several of these, covering some of the more important expeditions. The last one of these is now before me; and, as its recorded results, discoveries and contributions to science are so remarkable, I am sure that no apology is required for making a brief notice of them here.

This, the fourteenth excursion of the kind, was made during 1914, the start having been made about the middle of June. On this occasion Captain White officially represented the Royal Society of South Australia and the Royal Geographical Society of Australia as the associated naturalist, and he was fully equipped for the most varied duties pertaining to that part of the work. Mr. G. M. Mathews, F.R.S.E., the distinguished ornithologist of Australia, accompanied them, with other noted individuals, the party as a whole being a large one. Baggage and collecting material of all kinds was packed on camels, sixteen of these valuable animals forming a part of the expedition, which, for this particular year, was known as the "Geological Survey Expedition." It started at the terminus of the railroad on June 17, 1914, at a place called Oodnadatta, with all hands well and everything in fine shape. After reaching the Alberga River, it followed this stream more or less closely for a long distance, and then made direct for the Everard range of mountains, where considerable collecting and survey work was accomplished. Skirting the foothills, it returned to Moorilyanno N. Well, and took a side route to examine Indulkana Spur and neighboring territory. The route then led to the Musgrave ranges far beyond, the expedition being subjected to terrible hardships on

account of the heat, the drought that prevailed, lack of water, and similar causes.

Captain White's booklet of 200 pages is a day-to-day record of the entire history of this expedition, with a detailed account of its achievements for science. He took many valuable photographs of natives, animals, botanical specimens and localities, and not a few of these have been reproduced to illustrate the little volume, while a map of the route traversed is inserted opposite the preface. Many of the mammals, birds and other forms of life are described in great detail, and in the most lucid and interesting manner. A great part of this must necessarily be omitted from the brief notice I am now writing, and the space allowed me given over only to a reference to the more important discoveries and results achieved by the party. Among the first successes scored was the rediscovery of John Gould's long-lost bird, *Aphelocephala pectoralis*, formerly *Xerophila pectoralis*, a single specimen having been taken in 1871 and lost shortly thereafter. Several specimens were obtained by Captain White and his most efficient collector, Mr. J. P. Rogers. On one page he writes, about six or seven days after the start:

A little after noon we reached one of Mr. Breaden's wells near Murdaruma, on the Woldridge Creek, where the camels were watered and we had some lunch. One of those tragedies which are so often enacted in the far-back country came under our notice. A bait had been laid for wild dogs, and a fine dingo had been successfully poisoned; but, unfortunately, a party of wedge-tailed eagles had attacked the carcass of the dog, the result being that some of these fine birds lay dead around, the great wings stretched out (they are the largest eagles in the world) over the ground in their last agonies, others were sitting round, unable to escape, due to the paralyzing effect of the poison (p. 16).

All the scientific members of the expedition became much excited as it approached the Musgrave range, for scarcely anything was known of the flora and fauna there, and footprints of the "wild men" had already been discovered by the camel drivers. Almost at once a new plant was collected, and it has since been

named by Mr. Black *Foxanthes whitei*. The weather was cold, and the water-bags froze hard during the night. There is a fine description given of Glen Ferdinand, and of some of the remarkable birds found in the surrounding region. Among these may be mentioned the rare blue-vented parrot (*Neopsephoatus burkii*), the crested pigeons (*Ocyphaps lophotes*), the white-fronted honey-eaters (*Ramsayornis albifrons*), and the curious little buff-throated grass-wren (*Diaphorillas t. purnelli*), a most extraordinary species both in coloration and in habits.

Some of the species of ants met with are described in detail by Captain White, and the description of their nests and their ways makes a most interesting chapter, not to say a very remarkable one.

Some of the boulders and rocks and walls of the great caverns had strange pictographs upon them, drawn there by some unknown natives; there were other evidences of the latter's existence.

In due time the expedition returned to the Everard ranges; the main one was entered and the signs of the existence of natives became more abundant. Footprints were fresh, and every one felt that these strange people would soon be met with in their own little-known land. Soon they were heard giving signal calls, which a native with the expedition answered as best he could, for he was not of their tribe. Finally a dozen or so of them put in an appearance. Captain White says:

They were all armed with two or three spears of the single-barb variety, which they called "ooruta," a yam stick, "wanar," and they also carried a long-shaped wooden bowl, "mera," which is used for carrying food, for scooping out the sandy soil when hunting for food, and for many other uses. They did not wear covering of any kind. A single or double strand of hair string encircled their waists, and their chests were covered with red ochre, with a circle of white down from the wedge-tailed eagle, extending from one armpit down to the lower part of the chest and up to the other armpit; the down is stuck to the skin by means of human blood. They were mostly young men, and their hair was bound into a chignon shape, which stood out, in some cases, over a

foot behind and was decorated with hawk's feathers (p. 76).

As these natives followed along with the expedition for a number of days, Captain White was afforded the opportunity to study not a few of their habits and customs; indeed, before this exploratory excursion drew to a close, he not only was the discoverer of an entirely new tribe, but he contributed a mass of ethnological and anthropological knowledge to what we formerly knew of the native tribes. This was not only new, but also of great importance, especially in view of the fact that these black men are now gradually being eliminated by the whites, and will soon become utterly extinct. Miscegenation with respect to the two races practically amounts to nil; moreover, the native women, as in the cases of other low races, are usually nonfertile in such crossing.

The women of this tribe never wear clothing of any kind, and Captain White's photographs of them exhibit those he succeeded in obtaining entirely nude. They have great affection for their children, and are much pleased when strangers pay them any attention. The peculiar ceremonies of this tribe are described by our intrepid explorer with very considerable detail, and among other things he remarks:

The dry watercourse before mentioned still traversing our line of march, we were at times passing over its loose, sandy beds, with a row of red-gums (which lined the watercourse) on either side. A native would give forth a sharp exclamation while looking up into one of the gumtrees. Then, in the twinkling of an eye, half a dozen natives would be up that tree, their lithe, muscular and naked forms moving from branch to branch with the ease of apes. They were in search of the large white grubs, or larvae, of a well-known moth, which passes the first part of its existence boring in the gum wood. These grubs are much sought after by the natives, who call them "margoo." It is wonderful how they can tell at a glance if the grub is at home, and how well they can make a hole in the gum wood with a sharp-pointed stick hardened by fire! When the search was over, down they would come again to mother earth with a grunt, and on the march again. Not an item of anything missed these happy children of the desert. They would try to show me a bird, a reptile

or an insect at a distance when the object was stationary; and after several minutes of vain attempts to show me where it was, the object would move off; if I showed my vexation, they would laugh softly and pass remarks among themselves. Tracks, which these wild men saw at a glance as they walked along, the sight expressed only by a nasal "hem, hem" and the outspreading of the fingers, or the pointing in a certain direction with the index one, were not revealed to me, when, on hands and knees, I was peering into the spot where the track, to my dusky companions, was easily seen; and when I rose with a shake of the head, they only quietly laughed and passed on, wondering, no doubt, at the slow-witted white man.

Captain White found but few mammals in the country traversed, and snakes, too, were rare. Upon the other hand, quite a number of new birds were taken, and the specimens brought back with the party. In fact, ninety-four species of birds were collected, five of which were new. Many undescribed insects were found in the stomachs of the small birds brought back, and the main collection of spiders and insects contained a great many more entirely new forms. New moths and ants were also taken, the latter being worked up by Professor W. M. Wheeler, of Harvard University. Professor Wheeler found nineteen species of ants new to science. Five new plants were found in the two hundred species collected, one of which was a heretofore undescribed species of tobacco.

Another expedition will soon be organized; doubtless many more novelties will be discovered, and more exhaustive studies made of the rapidly disappearing natives.

R. W. SHUFELDT

WASHINGTON, D. C.,
September 14, 1916

SPECIAL ARTICLES
THE OVULATION PERIOD IN RATS

THERE are many observations on the occurrence of ovulation in mammals; but very few investigations on the regular recurrence of that event, perhaps because of the fact that such investigation must involve the systematic study of sections of whole ovaries and oviducts of animals killed at frequent intervals over